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**Israeli News media coverage of COVID-19 and use of cannabis and tobacco: A
case study of inconsistent risk communication**

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Highlights:

- Scientific studies regarding the relation between tobacco and cannabis use and COVID-19 related risk of infection and disease severity is evolving and controversial. It is unclear how the relation is being reported on in mass media.
- This study reports results from a quantitative content analysis of news articles on tobacco and cannabis use and COVID-19 risk of infection and disease severity.
- Tobacco use is generally described as a risk factor for COVID-19.
- The reported relation between COVID-19 risk and cannabis use is conflicting with emphasis on both protective and detrimental associations.
- Public health messages are needed to communicate accurate and objective information regarding the link between cannabis/tobacco and COVID-19 risk.

Abstract

Background: There is continued scientific debate regarding the link between risk of COVID-19 infection and increased disease severity and tobacco and cannabis use.

The way this topic is presented in news media coverage may influence public attitudes and behavior and is thus an important topic of investigation. This study examines (1) the extent to which Israeli news media reported a positive (i.e., protective/therapeutic), negative (i.e., harmful), or inconclusive association between three types of substance use (tobacco, medical cannabis, recreational cannabis) and risk of COVID-19 infection and/or increased disease severity, and (2) the extent that this media coverage refers to scientific research.

Methods: A quantitative content analysis of news articles related to tobacco and cannabis use and COVID-19 ($N = 113$) from eleven of the highest circulation newspapers in Israel.

Results: News items were significantly more likely to mention increased COVID-19 risk for tobacco use, compared to cannabis use. All medical cannabis news items reported that medical cannabis use was associated with reduced COVID-19 risk. In contrast, news items about recreational cannabis use were more likely to describe a balanced or inconclusive risk for COVID-19, or increased risk. The majority of articles referred to scientific research.

Conclusion: While Israeli news media reported a relatively consistent message about the increased risk of COVID-19 in relation to tobacco use, messages about cannabis use were less consistent in communicating risk information. Research should examine effects of media coverage of tobacco and cannabis use and COVID-19 on public perceptions and behaviors.

Key words

COVID-19, tobacco, medical cannabis, recreational cannabis, mass media, content analyses, risk communication

Introduction

Since the beginning of 2020 the world has grappled with the COVID-19 pandemic and there has been a continued effort to investigate risk factors for infection and severe COVID-19 pathology, particularly those modifiable through public health interventions. Two of the proposed risk factors for COVID-19 infection and diseases severity are tobacco and cannabis use, although the evidence base for these associations is inconclusive. Some of the hypothesized risk association is thought to be through behaviors, e.g. sharing smoking paraphernalia (Chong, Acar, West, & Wong, 2022; Majmundar, Allem, Cruz, & Unger, 2020; van Laar, et al., 2020) or touching one's mouth during smoking (Sabino-Silva, Jardim, & Siqueira, 2020) which puts users at heightened risk for COVID-19 infection due to the exchange of respiratory droplets and saliva carrying the virus.

Another concern is that tobacco and cannabis use may pose an increased risk of COVID-19 infection and severity of disease through physical health related damage (e.g., weakened immune system, compromised lung health) caused by use of the substances (Chong, et al., 2022; Vardavas & Nikitara, 2020). However, the scientific claims for these reports have been subject to debate, with two early reviews on tobacco users reaching different conclusions (Lippi & Henry, 2020; Vardavas & Nikitara, 2020). Subsequent systematic reviews and meta-analyses concluded that smoking tobacco products is a risk factor for more severe progression of COVID-19 (Patanavanich & Glantz, 2020; Reddy, et al., 2021; Umnuaypornlert,

Kanchanasurakit, Lucero-Prisno, & Saokaew, 2021). Contradictory results have also been published related to e-cigarettes with some studies finding an increased risk of COVID-19 infection and severity among e-cigarette users (Gaiha, Cheng, & Halpern-Felsher, 2020; McFadden, et al., 2022), while others fail to confirm such an association (Jose, Croghan, Hays, Schroeder, & Warner, 2021; Kale, et al., 2021).

Similarly to tobacco use, cannabis is typically administrated by smoking or vaping (S. R. Sznitman, 2017) and associated with similar physiological damage as that caused by smoked tobacco (Lee & Hancox, 2011). Nevertheless, comparatively few studies have investigated the relationship between cannabis smoking/vaping and COVID-19 infection and disease severity (Volkow, 2020). The association between cannabis use and COVID-19 is particularly controversial as there is an empirical basis to suggest that, alongside potential adverse effects, cannabis use may confer beneficial effects. For example, cannabidiol (CBD) present in the cannabis plant, may reduce inflammation, which may reduce the risk of severe COVID-19 disease prognosis in some individuals (Brown, 2021). However, this was not confirmed in clinical trials (Crippa, et al., 2021), and scientists have warned against unfounded claims about CBD's protective effects related to COVID-19 (Brown, 2021). Other studies have proposed that cannabis may help alleviate the severity of depressive symptoms, thus helping vulnerable groups cope with mental health issues caused by the pandemic (Pacheco, et al., 2021).

The news media plays an important role in informing the public about COVID-19 (Rovetta & Castaldo, 2021; Su, et al., 2021). However, news media coverage may confuse or mislead the public, particularly when the scientific basis for the information evolves over time and appears to be contradictory (R.H. Nagler, et al., 2020). For example, early studies on the link between smoking and COVID-19

infection among Chinese patients reported that smoking had a protective effect, but did not adjust for relevant covariates and had other major methodological flaws.

These studies were reported on by journalists before undergoing adequate peer review and presented in a causal framework rather than as correlations (van Westen-Lagerweij, et al., 2021). Furthermore, twitter messages frequently cite news reports to spread false or unsupported messages about the protective effect of inhaled CBD and nicotine related to COVID-19 (Janmohamed, et al., 2020; Kavuluru, Noh, & Rose, 2022; Majmundar, et al., 2020).

The current study

To our knowledge, this study is the first attempt to investigate the way in which news media coverage described the link between COVID-19 risk and use of tobacco and cannabis. The study focuses on Israeli news reports as Israel represents a unique case study for various reasons. First, Israel houses one of the world's longest running medical cannabis programs (R. Sznitman, 2020). Second, while recreational cannabis use is illegal in Israel, cannabis use rates are relatively high in Israel (27% last month prevalence rates among adults) compared to other western countries (Harel-Fisch, 2017). Third, while tobacco use prevalence rates have been declining in Israel (from 39% in 2000 to 35% in 2015), they remain high compared to many other high-income countries (WHO., 2018). Fourth, the Israeli response to the COVID-19 pandemic was unique in that it was one of the first nations to close its borders and quarantine travelers returning from abroad (S. Sznitman, Rosenberg, & Lewis, 2022). Israel imposed strict lockdown measures early on in the pandemic and it was the first country to roll out a national mass vaccination program against COVID-19 (Cylus, Panteli, & van Ginneken, 2021). Understanding how news outlets in Israel report on tobacco and cannabis in relation to risk of COVID-19 infection and disease severity is

important as it may influence the public's attitudes and behavior related to the substances (Duong, Massey, Churchill, & Popova, 2021; Grummon, et al., 2020; Massey, Duong, Churchill, & Popova, 2022). As a unique case, Israel represents a potentially insightful case for future studies to compare and contrast with.

The current study was guided by the following objectives:

1. To examine the extent to which Israeli news media coverage reported a positive (e.g., protective/therapeutic), negative (e.g., risk), or inconclusive association between three types of substance use (tobacco, medical cannabis and recreational cannabis) and risk of COVID-19 infection and disease severity.
2. To investigate the extent to which media coverage of this topic refers to scientific research.

Methods

We sampled all news items that focused on COVID-19 and use of tobacco and/or cannabis that were published in the 11 highest circulation Israeli print and online news sources (Hebrew and English) from January 2020 through August 2021. These sources include general news outlets (Yisrael Hayom, Haaretz, Maariv, Walla, Mako/N12), news sources focused on financial news (Calcalist, Globes), and the most popular English language news sources (The Jerusalem Post, Haaretz – English edition, and the Times of Israel). The study was exempt from IRB review. To generate a sample frame of relevant news stories, we used the following search terms: “COVID*” or “corona*” and “cannabis*” or “grass / pot / weed” or and “marijuana*” or “cigarettes” or “smoking” or “vaping” or “nicotine” or “tobacco”. From this sampling frame ($N = 125$), we excluded duplicate items and those that did not relate to the study topic, resulting in an analytical sample of 113 news items.

Content Analysis

We developed a coding instrument that assessed media coverage of the link between COVID-19 risk and substance use, and the degree to which media coverage referred to scientific research. Two trained coders independently coded a randomly selected subset of 33 items (30% of the sample) to assess interrater reliability using Krippendorff's Alpha. After ensuring acceptable inter-coder reliability ($K \geq .80$, Hayes & Krippendorff, 2007) the remaining news articles were coded.

Measures

Substance: each newspaper article was coded in terms of which type of substance use it referred to: tobacco, recreational or medical cannabis ($\alpha = .87$). In cases where an item referred to more than one substance ($n = 6$) we coded for the more salient substance (i.e., the substance that was mentioned in the heading and/or was discussed in greater detail). Each newspaper article was also coded in terms of the mode of administration most referred to in the article: vaping/smoking vs. edible/others ($\alpha = 1.0$).

Risk relation: was coded in terms of whether newspaper articles reported the relation between the substance and COVID-19 to be one of the following mutually exclusive categories: (1) use of the substance increases risk of infection/severity of COVID-19 disease; (2) use of the substance lowers risk of infection/severity of COVID-19 disease; and (3) the relation between risk of COVID-19 infection/severity of disease and the substance is described as inconclusive or conflicting. Items were coded according to a primary focus of the article and three news items that did not fit any of these categories were coded as missing ($\alpha = .89$).

Reference to science: articles were coded for whether they explicitly referred to scientific evidence pertaining to the risk relation between COVID-19 and the substance. For example, items that mentioned a particular study/ies on this topic and

the findings of that study/ies were classified as referring to science, whereas items with no reference to scientific research or those that only referred generally to research were classified as not referring to science ($\alpha = .88$).

Data analyses

Data were analyzed using SPSS (27.0), using chi-square test for bivariate correlations.

Results

The sample consisted of 113 articles, of which 82 (72.6%) related to tobacco, 14 (12.4%) to medical cannabis and 17 (15.0%) to recreational cannabis (Table 1). Risk of COVID-19 infection/disease severity was mentioned more prominently in tobacco related articles compared to articles on the other substances (Figure 1), ($4, N = 110 = X^2 = 83.17, p < .001$). All of the articles about medical cannabis referred to a reduced risk for COVID-19 (infection/disease severity), whereas recreational cannabis use articles referred significantly less to a reduced risk association between the substance and COVID-19 infection/disease severity, and also included references to an inconclusive and increased risk association. There were no significant differences with regard to the proportion of items that referred to scientific evidence across the different substance types, $\chi^2 (2, N = 112) = 4.43, p = .11$ (Table 1).

We also tested the above-mentioned risk associations broken down by whether risk was described in relation to infection, severity, or both infection and severity. The results (available upon request) showed a similar pattern to that of the results reported above (Figure 1). However, due to the small sample size these fine-grained categorizations may be unreliable due to small (or empty) cell size.

[Table 1 & figure 1]

Since non-combustion administration modes may differ by substance use and relate to COVID-19 infection and disease severity we re-ran the main analyses

excluding articles reporting on edible/other types of administration ($n = 11$). The original patterns as described above remained (results available upon request).

Discussion

Although not yet extensively tested, initial evidence suggests that mass media reporting on topics related to cannabis, tobacco and COVID-19 may influence the public to reduce or quit smoking tobacco and cannabis products (Duong, et al., 2021; Grummon, et al., 2020; Massey, et al., 2022). The Israeli mass media may play a role in discouraging the use of tobacco during the pandemic by its relatively consistent emphasis on the detrimental link between the use of the substance and the risk of COVID-19 infection and/or disease severity. Tobacco-specific COVID-19 risk perceptions are related to reductions in tobacco use (White, et al., 2021). Future research should test if there have been changes in the prevalence of smoking/vaping tobacco in Israel during the pandemic, and whether exposure to media coverage is associated with such changes and perceived risk perceptions.

Similarly to recreational cannabis users, medical cannabis patients in Israel tend to use high THC products (Aviram, et al., 2021; Bar-Lev Schleider, et al., 2018; Sznitman S.R., Vulfson, Meiri, & Weinstein, 2020) and consume cannabis through smoking or vaping (Aviram, et al., 2021; S. R. Sznitman, 2017). Despite these similarities, news media coverage presents inconsistent messages about the nature of the relationship between the use of cannabis for medical and recreational purposes and risk of COVID-19 infection and disease severity. News items about medical cannabis overwhelmingly suggested that cannabis may offer protection against COVID-19 infection or severity while in recreational cannabis news items, cannabis was said to have an inconclusive or mixed association with COVID-19 risk.

This inconsistent risk communication might confuse the public as people may reasonably presume that one's reasons for using cannabis should not influence the effects of use on COVID-19 related risk. Research suggests that exposure to conflicting health information can relate to confusion about the health topic (R. H. Nagler, Yzer, & Rothman, 2018) or attitudinal ambivalence (Chang, 2013). Furthermore, it is possible that exposure to messages about a positive effect of medical cannabis use on COVID-19 protection may encourage the use of cannabis (Fishbein & Ajzen, 2010). This should be tested in future research. Public health stakeholders should attempt to communicate verified information to the general public regarding use of cannabis and tobacco and how it relates to COVID-19.

Reported results must be seen in light of study limitations. The small sample may have prevented detection of small albeit significant differences. The focus on traditional newspaper media and their online versions was chosen as it represents a useful proxy for news reporting, as they set the agenda for other news formats (Wakefield, Flay, Nichter, & Giovino, 2003). Furthermore, 95% of the Israeli population read newspapers (European Neighbourhood Journalism Network, 2014), rendering this news outlet an important channel for shaping public opinion and debate related to tobacco, cannabis and COVID-19. Nevertheless, there is a need to examine COVID-19 risk communication in other media outlets. This is especially true since commercial interests affiliated with tobacco or cannabis industries may be particularly likely to influence social media reports (Whitehill, Trangenstein, Jenkins, Jernigan, & Moreno, 2020).

Israel represents a special case study in terms of its unique medical cannabis policy history, relatively high recreational cannabis and tobacco use prevalence rates, and its national response to the COVID-19 pandemic. These elements may be related

with unique national media framings of the relation between tobacco, cannabis and risk of COVID-19 infection and severity. Research that tracks these frames in other countries and compares them across nations are needed to better understand general and unique national trends and its potential influence on public debate and behavior.

Conclusion

Israeli news reports have predominantly reported on an increased COVID-19 risk related to tobacco and a decreased COVID-19 risk related to medical cannabis. Media coverage of recreational cannabis use was more varied than medical cannabis use despite the fact that the substances are similar whether or not it is used for recreational or medical purposes. As such, despite the fact that news reports tended to refer to scientific evidence, the studies cited may have been cherry picked to fit the news story rather than to aid in balanced reporting. Research is needed to test whether the COVID-19 pandemic can be used as a window of opportunity for effective mass media messages that discourage use/chronic heavy use of tobacco and cannabis.

Declaration of Competing Interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Ethics approval

☐ The authors declare that they have obtained ethics approval from an appropriately constituted ethics committee/institutional review board where the research entailed animal or human participation.

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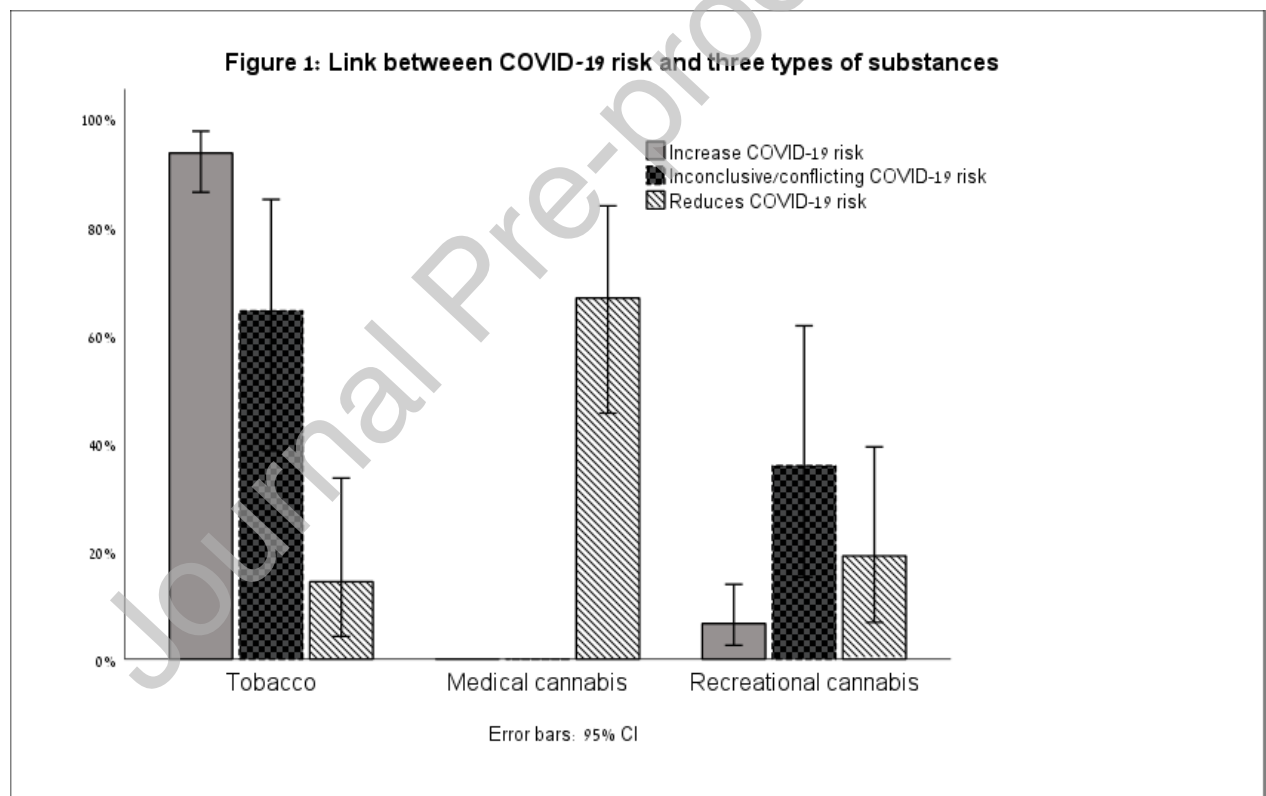


Figure 1. Link between COVID-19 risk and three types of Substances

Table 1: sample characteristics and distribution of the three substances, COVID-19 risk and reference to science

	Tobacco, N (%)	Medical Cannabis, N (%)	Recreational Cannabis, N (%)	Total, N (%)	P value
	82 (72.6)	14 (12.4)	17 (15.0)	113 (100)	
Risk Relation					
Increase COVID-19 risk	71 (86.6)	0 (0)	5 (35.7)	76 (69.1)	<0.001
Inconclusive/conflicting COVID-19 risk	8 (9.8)	0 (0)	5 (35.7)	13 (11.8)	
Decrease COVID-19 risk	3 (3.6)	14 (100)	4 (28.6)	21 (19.1)	
Science					
Reference to science	47 (57.3)	12 (85.7)	11 (68.8)	70 (62.5)	0.109

Note: p-value based on Chi-square.